ZEROWIRE® G2

Advanced Wireless HD-Video Transmission System

USER MANUAL

ENGLISH

NDS

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Table of Contents

Section 1
- Warnings and Cautions ---- ii
- Recycling ---- ii
- Declarations of Conformity ---- iii
- Legal Statement ---- iii

Section 2
- About This Manual ---- 1
- Intended Use and Contraindications ---- 1
- Overview ---- 1
- Noninterference Distance ---- 2

Section 3
- Connector Panels ---- 3
- Installation ---- 4
- Power Options ---- 6
- Wiring Diagrams ---- 7
- Cable Bend Radius ---- 7
- Setup ---- 8
- Typical Installation ---- 9
- Performance ---- 9
- Positioning and Orientation ---- 10
- Non Line of Sight Operation ---- 12
- Avoiding Co-Channel Interference ---- 13
- Channel Usage ---- 13
- Multi System Installation ---- 13
- Signal Strength and OSD Diagnostic Messages ---- 14

Section 4
- Troubleshooting ---- 15

Section 5
- Specifications ---- 16
- Maximum EIPR Output Power of Test Frequency ---- 16
- Supported Video Modes ---- 17
- ZeroWire G2 Accessory Kits by Display ---- 18
- Cleaning Instructions ---- 19

Section 6
- Electromagnetic Compatibility (EMC) Tables ---- 20
- Contact ---- Back

1 Warnings and Cautions

This symbol alerts the user that important information regarding the installation and / or operation of this equipment follows. Information preceded by this symbol should be read carefully in order to avoid damaging the equipment.

This symbol warns user that un-insulated voltage within the unit may have sufficient magnitude to cause electrical shock. Therefore, it is dangerous to make contact with any part inside the unit. To reduce the risk of electric shock, **DO NOT** remove cover (or back). There are no user serviceable parts inside. Refer servicing to qualified service personnel.

This symbol cautions the user that important information regarding the operation and / or maintenance of this equipment has been included. Information preceded by this symbol should be read carefully to avoid damage to the equipment.

This symbol denotes the manufacturer.

This symbol denotes the manufacturer's European Community representative.

To prevent fire or shock hazards, do not expose this unit to rain or moisture. Also, do not use this unit's polarized plug with an extension cord receptacle or other outlets unless the prongs can be fully inserted. The product is designed to meet the medical safety requirements for a patient vicinity device.

This product is a Class I medical device according to M.D.D. in Europe. No modifications are allowed.

This product is a Class II medical device in the United States and Canada. No modifications are allowed.

This equipment/system is intended for use by healthcare professionals only.

Federal law restricts this device to sale by or on the order of a medical practitioner.

These are the European countries that accept CE marked devices: Belgium, Bulgaria, Croatia, Cyprus, Germany, Hungary, Iceland, Macedonia, Montenegro, Norway, Romania, Slovakia, Spain, Switzerland and United Kingdom.

Safety Compliance:
This device is T.U.V. approved with respect to electric shock, fire and mechanical hazards only in accordance with CAN/CSA C22.2 No. 60601-1 and ANSI/AAMI ES60601-1.

Safety Compliance:
This device meets the requirements of EN60601-1 so as to conform to the Medical Device Directive 93/42/EEC and 2007/47/EC (general safety information).

Radio Approval:
This device meets the requirements of EN 302 065 V1.2.1 and conforms to Radio and Telecommunications Terminal Equipment (R&TTE) Directive 1999/5/EC.

FCC Identification: UK2-SII-SK63102, UK2-SII-SK63101
Industry Canada: 6705A-SIISK63102, 6705A-SIISK63101

This product complies to the above standards **only** when used with an NDS supplied medical grade power supply.

Model	ZeroWire G2
Power Supply	Ault MW172KB2400B02 or GlobTek GTM91120-3024-T3A
AC Input	100 to 240 Volts at 50 to 60 Hz.
DC Output	Ault 24 volts at 0.75 amps / GlobTek 24 volts at 1.25 amps

Power Cord: Use a hospital grade power cord with the correct plug for your power source.

Disconnect the power cord from the AC mains. The power cord is the only recognized disconnect device.

The MEDICAL EQUIPMENT should be positioned so that its disconnect device is readily accessible.

The device should be powered from a center tapped circuit when used in the US at voltages over 120 volts.

This product is intended for continuous operation.

Recycling:
Follow local governing ordinances and recycling plans regarding the recycling or disposal of this equipment.

Declarations of Conformity

FCC and Council Directives of European Standards:

This device complies with Part 15 of FCC rules and 93/42/EEC and 2007/47/EC of the Council Directives of European Standards. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable results.

1. Use the attached specified cables with the device so as not to interfere with radio and television reception. Use of other cable and adapters may cause interference with other electronic equipment.
2. This equipment has been tested and found to comply with the limits pursuant to FCC part 15 and CISPR 11under clause 3.1 and 8.5. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
3. This equipment has been tested and found to comply with the limits pursuant to FCC part 15.255(g) on maximum permissive exposure. This equipment generates radio frequency energy and must be installed and used with a minimum separation of 20 cm from the user or patient

IEC:

This equipment has been tested and found to comply with the limits for medical devices to the IEC 60601-1-2. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to other devices in the vicinity.

FCC, Council Directives of European Standards and IEC:

There is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the transmitter and / or the receiver.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult your dealer or an experienced radio/TV technician for help.

Accessory equipment connected to this device must be certified according to the respective IEC Standards, i.e. IEC 60950-1, for data processing equipment and IEC 60601-1 for medical equipment. Furthermore, all configurations shall comply with the system standard, IEC 60601-1-1. Anyone who connects additional equipment to the signal input part or signal output part configures a medical system, and is therefore responsible that the system complies with the requirements of system standard IEC 60601-1-1. Whoever is responsible for securing the device to a system needs to insure that the mounting equipment used with this device complies to IEC standard 60601-1. If in doubt, consult with your vendor's technical service department.

Legal Statement

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Customers are cautioned that system configuration, software, the application, customer data and operator control of the system, among other factors, affect the product's performance. While NDS products are considered to be compatible with many systems, specific functional implementation by customers may vary. Therefore, suitability of a product for a specific purpose or application must be determined by the consumer and is not warranted by NDS.

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About This Manual

This manual is designed to assist the user with installation, setup and operation of the ZeroWire® G2 wireless video system.

A numbered tab on the side of the page denotes the beginning of a section.

The functional descriptions in this manual are representative of:
ZeroWire G2 Receiver
ZeroWire G2 Transmitter (Input: DVI and 3G-SDI)

Product part numbers and accessories can be found on Page 18.

Intended Use and Contraindications

The NDS ZeroWire G2 is a paired wireless video communication transmitter and receiver, intended for delivery of video signals from a source such as an endoscopy camera/processor, or other video source over a radio-frequency link to a ZeroWire Receiver for display of images during endoscopic and general surgical procedures. The ZeroWire G2 wireless video system is a non-sterile reusable device not intended for use in the sterile field.

Contraindications:

1. These units are non-sterile reusable devices and are not intended for use within a sterile field.
2. This equipment may not be used in the presence of flammable anesthetics mixture with air, oxygen or nitrous oxide.

Warning:

Do not use in MR Environments.

No part of this product may come in contact with a patient. Never touch the product and a patient at the same time.

For mission critical applications, we strongly recommend that a replacement ZeroWire G2 transmitter and receiver pair, and a DVI cable, be immediately available. Additionally, we recommend that a display that is hard wired to the video source be immediately available whenever a surgical procedure is in progress. See typical installation drawing on page 9.

At any time , a minimum separation of 20 cm must be maintained from the operating device and the user or patient.

Overview

The ZeroWire G2 System allows wireless delivery of video signals from the DVI or 3G-SDI output of an endoscopic camera processor or other video source to the DVI input of a video display. It operates as a 60Ghz-based wireless HD system in compliance with FCC (Part 15) rules governing the unlicensed 57-64 GHz band which is located in the millimeter-wave (mmW) portion of the electromagnetic spectrum.

A System is composed of a Transmitter and Receiver pair. The Transmitter and Receiver are designed to be mounted on the top rear edge of a display. The Transmitter may obtain its input video signal from either an endoscopic camera processor or the display's DVI or SDI re-drive outputs. The Receiver's output is connected to a display's DVI input The units are powered from an NDS 24 VDC power supply or through the 'Y' adapter cable*.

The 'Y' adapter cable is described on page 6. A typical installation is shown on page 9.

***Note:** The 'Y' adapter cables are only for use with NDS displays that are powered by an NDS 24 VDC power supply.

Overview (continued)

ZeroWire G2

Specifications	
Wireless Signal Type	60 GHz Wireless HD band (WiHD)
Frequency Band	57 - 64 GHz
Video Compression	None
Video Inputs (Tx)	DVI-D, 3G-SDI
Video Outputs (Rx)	DVI-D
3D Video Support	DVI-D Interleaved (Line-by-Line)
HIPAA Support	256 bit AES Encryption
System Latency	< 1 Frame
Maximum Pairs per OR	2 Pairs
RF Power Out	< 28 dBm/MHz EIRP
Maximum Range	< 30 ft (9.14m)
Data Rate	950 Mbps - 3.8 Gb/s
Power Consumption	< 8 Watts

Supported Displays
EndoVue 21"
EndoVue 24"
Radiance HD 23"
Radiance G2 24"
Radiance Full MMI 24"
Radiance Full MMI 26"
Radiance G2 HB 26"
Radiance Ultra 27"
Radiance Ultra 32"
Radiance G2 42"
Radiance G2 55"

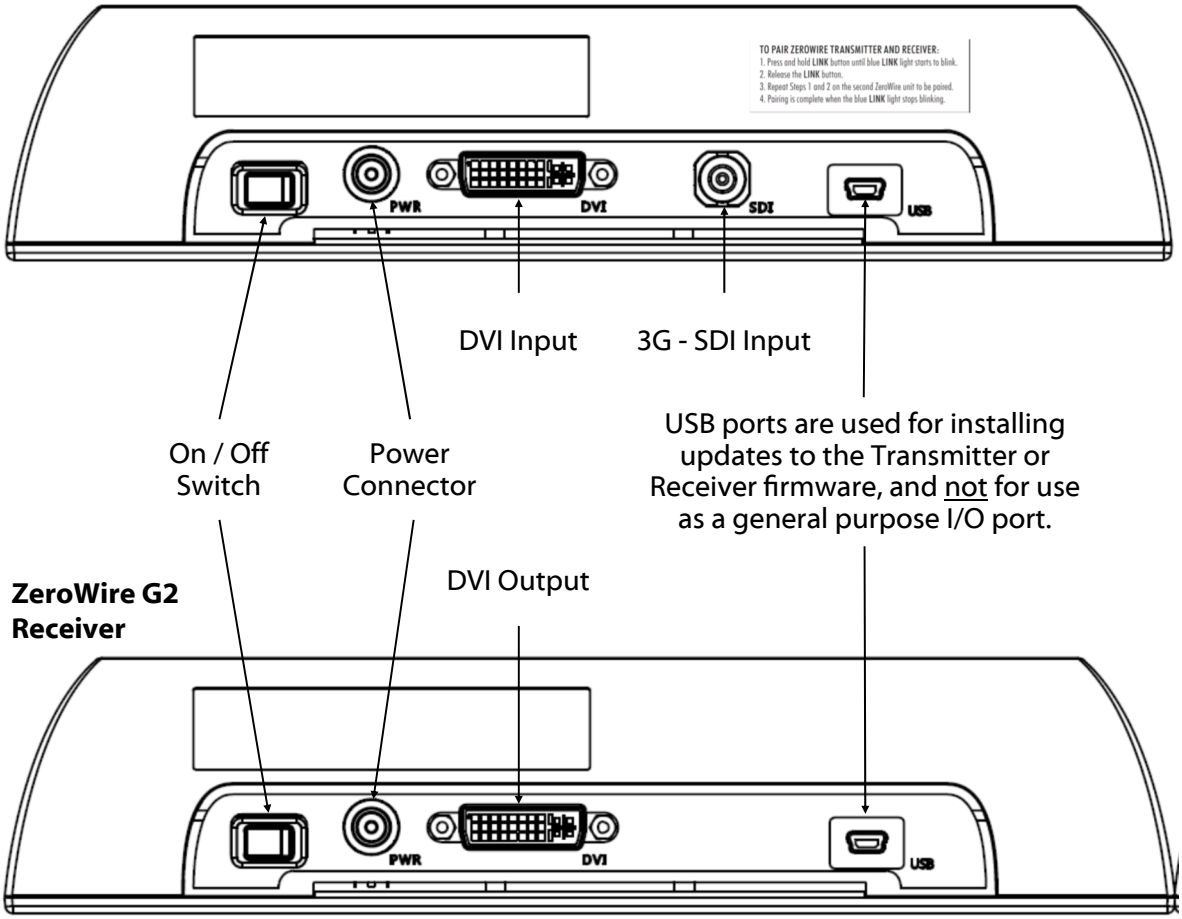
Noninterference Distance

The listed devices on the following table have been tested to demonstrate the minimum safe distances for the ZeroWire G2 to be operating without any interference with each other. At any time, if the ZeroWire G2 is believed to be causing or getting the interference from those devices, simply move the devices away from each other, and then maintain at least the separations as specified in the table

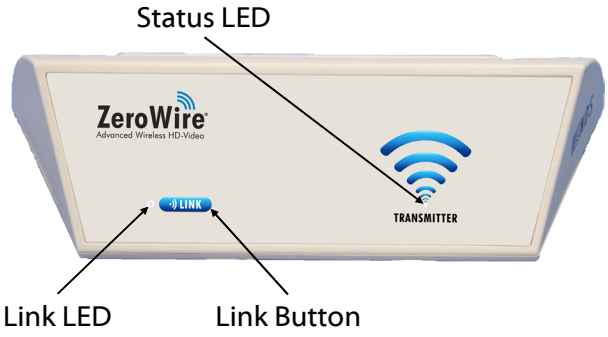
Tested Equipment	Distance To Transmitter	Distance to Receiver
Electrocautery	> 2 feet	> 1 foot
RFID	> 1 cm	> 1 cm
2.4Ghz Wireless Access Point	> 6 inches	> 6 inches
5.8Ghz Wireless Access Point	> 6 inches	> 6 inches
Cell Phone	> 1 cm	> 1 cm
Bluetooth Device	> 1 cm	> 1 cm

3 Connector Panels

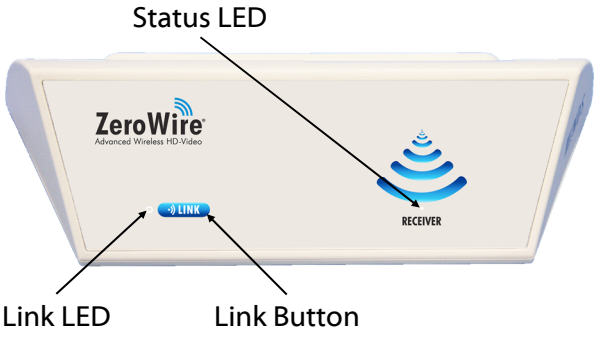
ZeroWire G2 Transmitter


TO PAIR ZEROWIRE TRANSMITTER AND RECEIVER:
1. Press and hold LINK button until blue LINK light starts to blink.
2. Release the LINK button.
3. Repeat Steps 1 and 2 on the second ZeroWire unit to be paired.
4. Pairing is complete when the blue LINK light stops blinking.
PWR
DVI
SDI
USB
DVI Input
3G - SDI Input
On / Off Switch
Power Connector
USB ports are used for installing updates to the Transmitter or Receiver firmware, and not for use as a general purpose I/O port.
DVI Output
ZeroWire G2 Receiver
PWR
DVI
USB

Transmitter Link and Status LEDs



Receiver Link and Status LEDs



The LINK button is used to link a Transmitter to a Receiver.

On the Receiver, the LINK button is also used to activate the Signal Strength bar graph described on page 14.

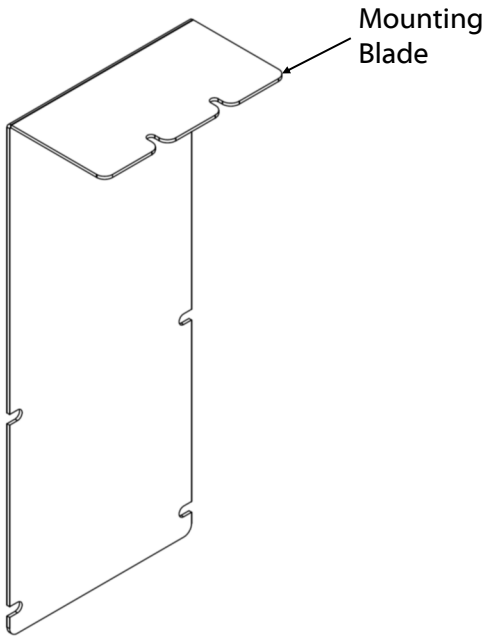
Installation

Mounting Brackets:

Refer to the ZeroWire G2 Accessory Kits by Display table on Page 18.

Installation: (For Mounted Displays)

Note: This installation requires two people: one to support the display, and one to perform the installation.



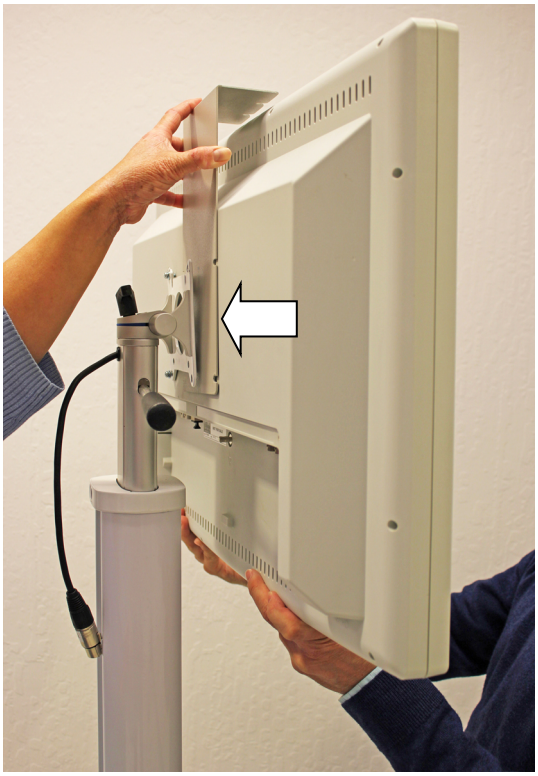
Replace the left-side mounting screws with two of the provided longer length mounting screws.

Tighten the provided left-side screws only 2-3 turns.

Remove the two-right side screws from the VESA mount.

With the mounting blade facing the front of the display, slide the step bracket between the VESA mount and the back of the display until notches labeled for the display you are working with fit over the two left-hand screws.

Replace the right-hand screws with the provided screws and tighten all screws.

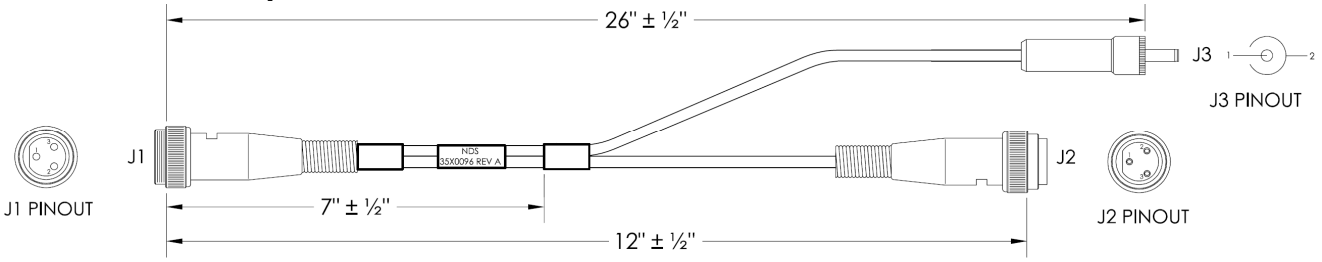


With the back of the ZeroWire G2 Transmitter or Receiver module facing the front of the display, align the slot on the bottom of the module with the mounting blade, and push the module onto the mounting blade until the module is firmly seated.

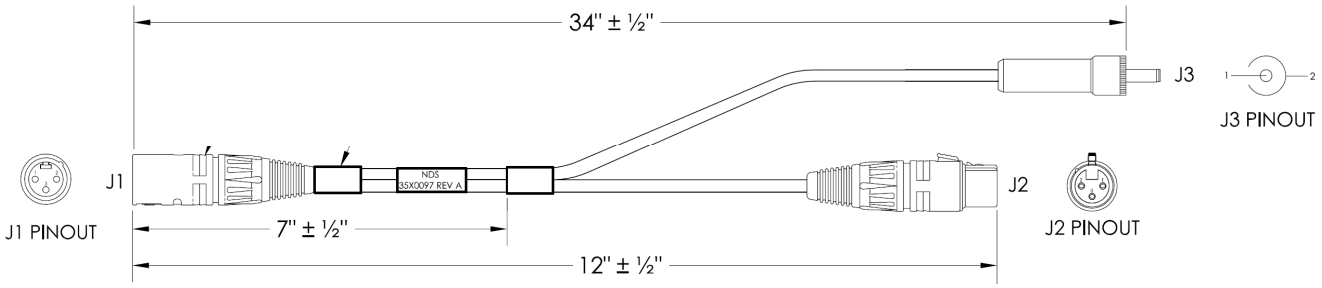
Power Options

ZeroWire G2 Transmitters and Receivers used with a supported 32" or smaller NDS display can use an optional 'Y' adapter cable for powering the ZeroWire unit. The two types of 'Y' adapter cables are shown below. Where applicable, the appropriate Y-cable is included in the accessory kit (see page 18 to determine the correct accessory kit for the NDS display being used). ZeroWire Transmitter and Receiver units can also be powered using the included 24 VDC power supply.

SwitchCraft 'Y' Adapter Cable (35X0096)



XLR 'Y' Adapter Cable (35X0097)



Note:
Model numbers of 24 VDC power supplies are shown here.

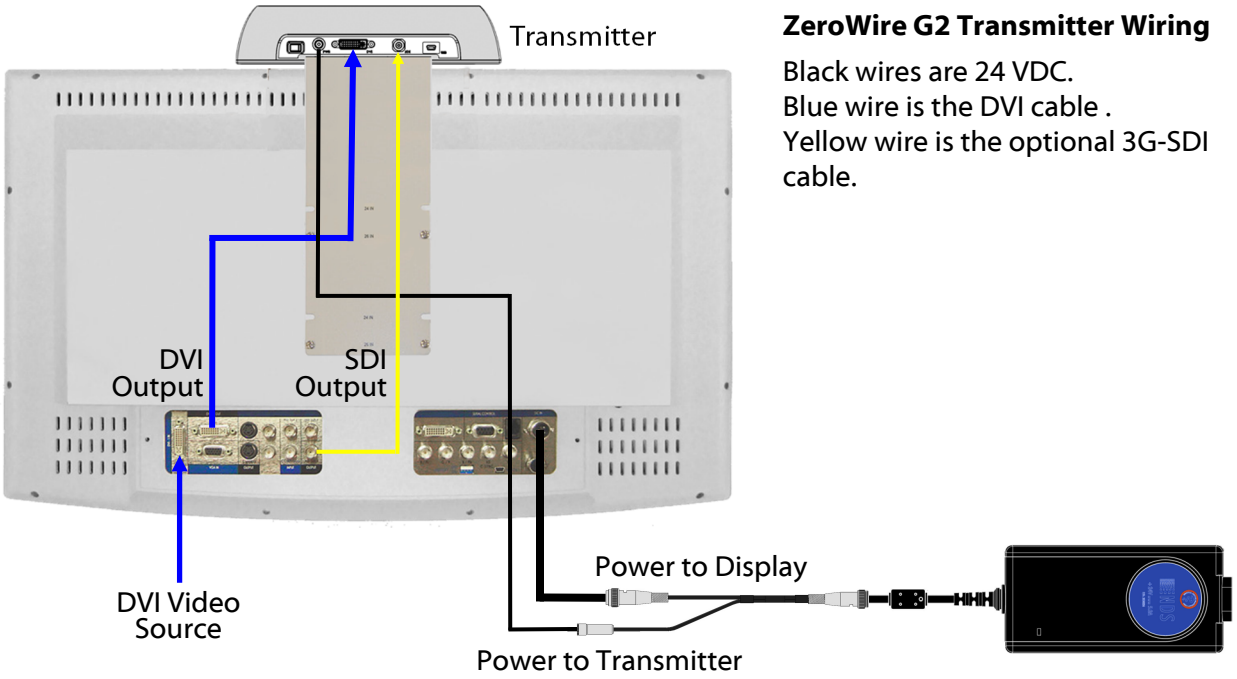
J3 of the 'Y' adapter or 24 VDC power supply connects here.

GlobTek GTM91120-3024-T3A

Ault MW172KB2400B02

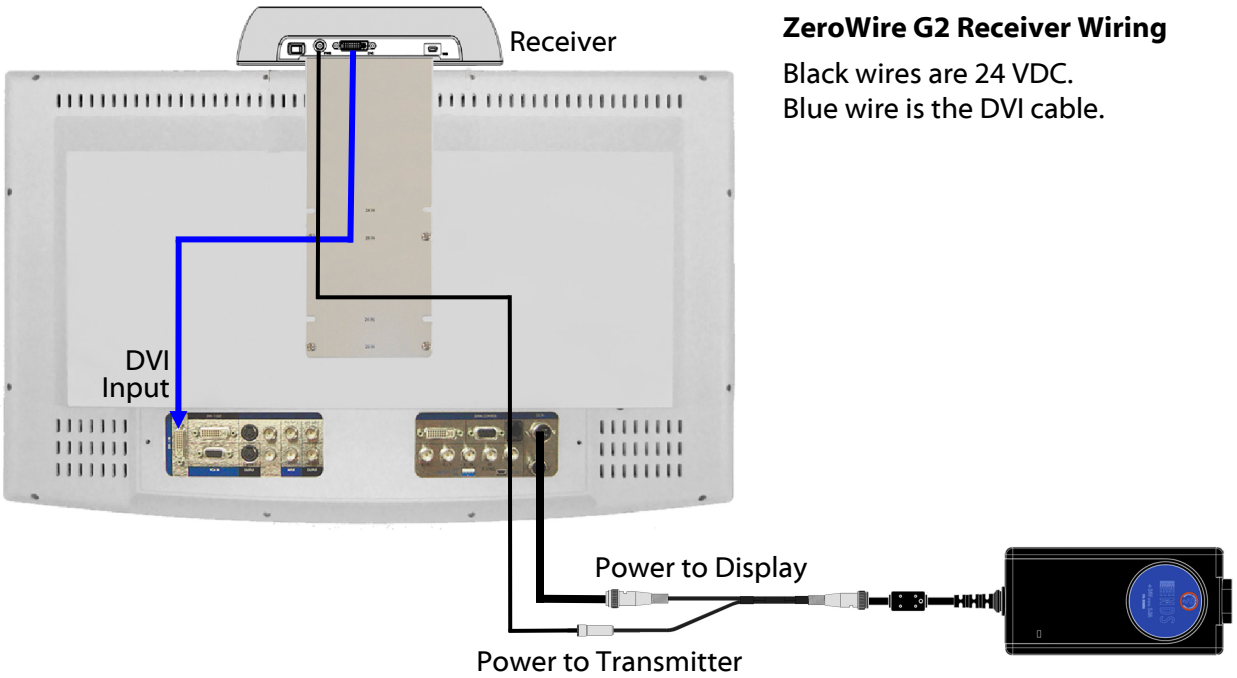
When using the power supply, select and install the plug adapter that matches the power requirement.

Wiring Diagrams



ZeroWire G2 Transmitter Wiring

Black wires are 24 VDC.
Blue wire is the DVI cable .
Yellow wire is the optional 3G-SDI cable.



ZeroWire G2 Receiver Wiring

Black wires are 24 VDC.
Blue wire is the DVI cable.

Cable Bend Radius

We recommend that the bend radius of metallic cables be no less than 2.5 inches (63 mm) or 7 times the diameter of the cable whichever is greater. Sharper bends may damage the cable and/or degrade the video signal.

Setup

Linking the Transmitter and Receiver

Prior to placing the ZeroWire G2 system in service, the Transmitter and Receiver pair must be linked.

Once a Transmitter and Receiver pair is linked, they remain linked until the Transmitter is explicitly linked to another Receiver or the Receiver is explicitly linked to another Transmitter.

Note: If a linked pair is turned off they will automatically link to each other when they are turned on again.

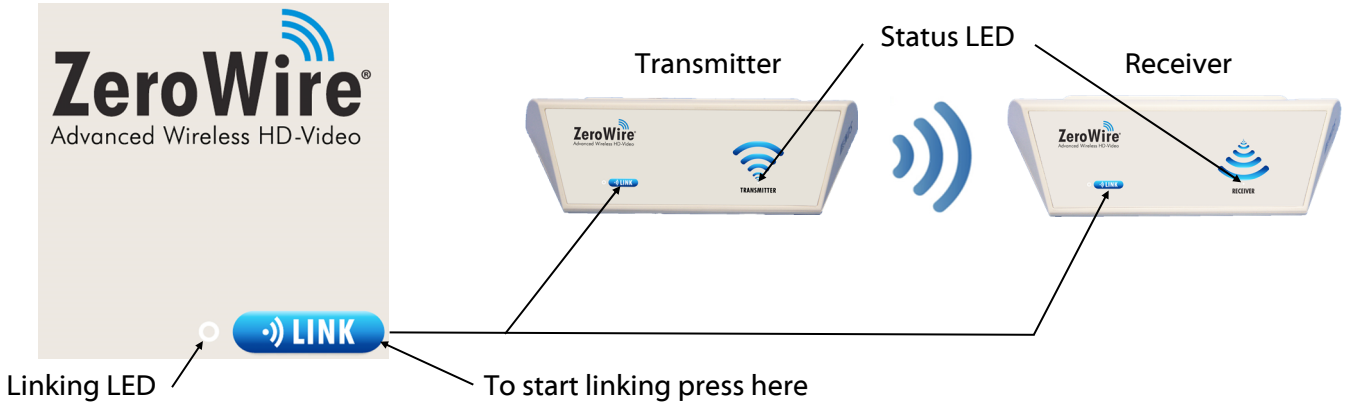
Linking Procedure:

1. Connect a DVI or SDI video source to the Transmitter unit and a display to the Receiver unit's DVI output (See Figure 1).
2. Press and hold the "LINK" button (see Figure 2) on the Receiver unit until its linking LED begins flashing blue rapidly, then release. At this point, the user has 60 seconds to move to the other unit and press the LINK button on that device.
3. Next, press and hold the "LINK" button (see Figure 2 for location) on the Transmitter unit until its linking LED begins flashing blue rapidly, then release.
4. When the Transmitter and Receiver units identify each other and begin to link, both the Status LED and Link LED on both units will flash rapidly for several seconds. Once the link is established, each unit's linking LED turns off.

Note: ZeroWire G2 Transmitter and Receiver units are <u>not</u> compatible with earlier ZeroWire Transmitter and Receiver units.

Figure 1

Figure 2

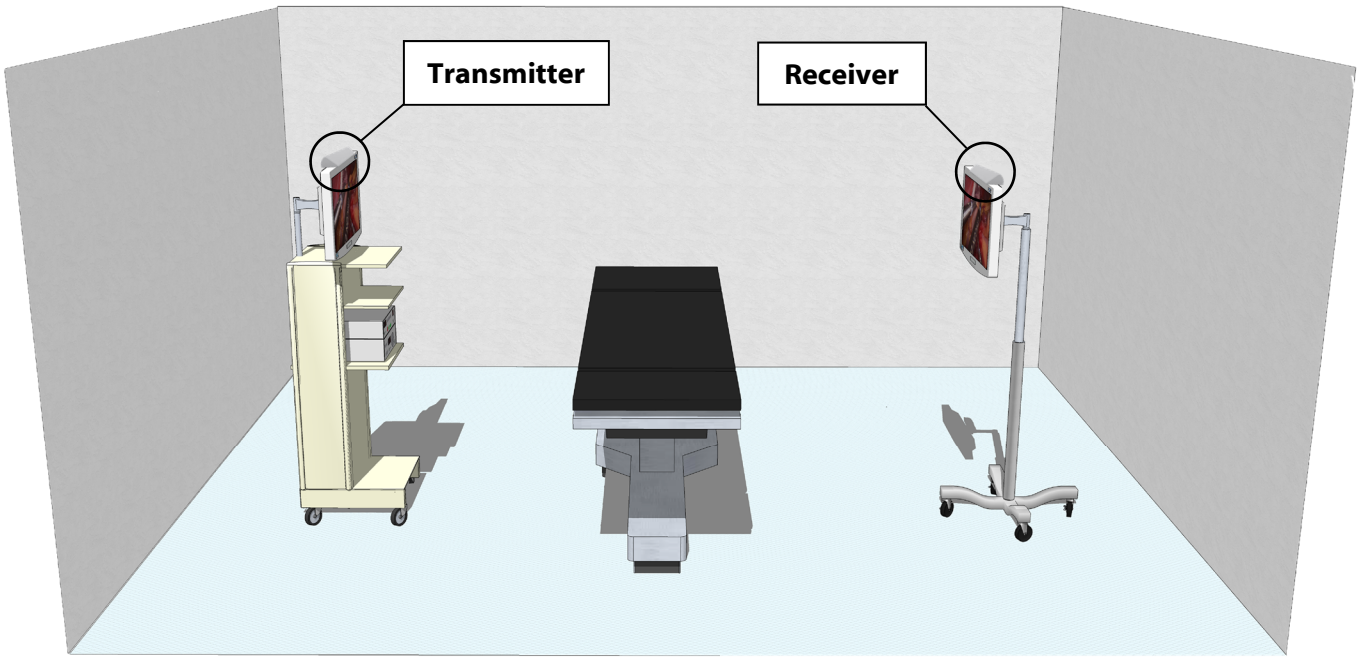


Passing Video:

With the linking completed, the status LEDs should turn blue and the source image should appear on the display. This completes the basic setup.

Note: The Transmitter and Receiver are not limited to line-of-sight operation, i.e., the pair will operate reliably despite the presence of intervening obstacles. However, neither unit should be completely surrounded by metallic objects.

Typical Installation



For mission critical applications, we strongly recommend that a replacement ZeroWire G2 Transmitter and Receiver pair, and DVI cable, be immediately available. Additionally, we recommend that a display that is hard wired to the video source be immediately available whenever a surgical procedure is in progress.

Performance

Performance:

ZeroWire G2 HD Wireless Video System is intended and optimized for use in surgical or procedure rooms. Use outside of a clinical environment is not recommended.

The following steps will help you to achieve optimal performance of the ZeroWire G2 system:

1. Mount both components at least 5 feet (1.5 m) from the floor.
2. Ideally, both the transmitter and receiver should be at the same height.
3. For a reliable video link, please follow the setup guidelines under Positioning and Orientation on pages 10 and 11.
4. The transmitter and receiver should be facing each other and be visible to each other in free air space.
5. For non line of sight applications, we recommend that the Transmitter and Receiver be located within 6 feet (1.8 m) or less from the walls.

Positioning and Orientation

Due to the shape of the antenna's signal field, both Transmitter and Receiver units should be installed so they are aligned vertically and horizontally within ±10°.

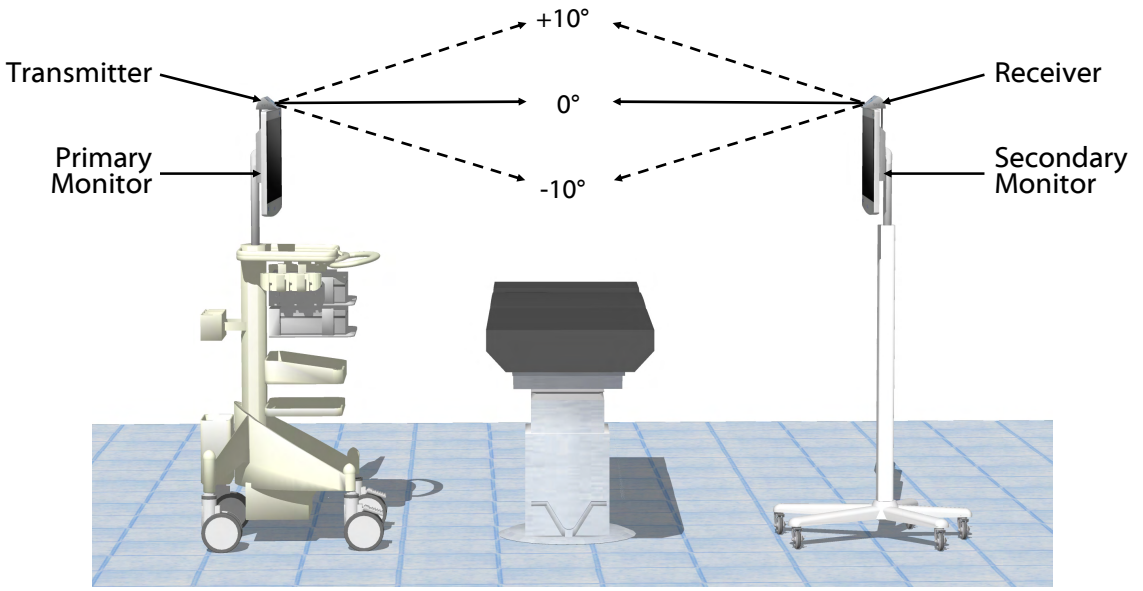
Vertical Alignment:

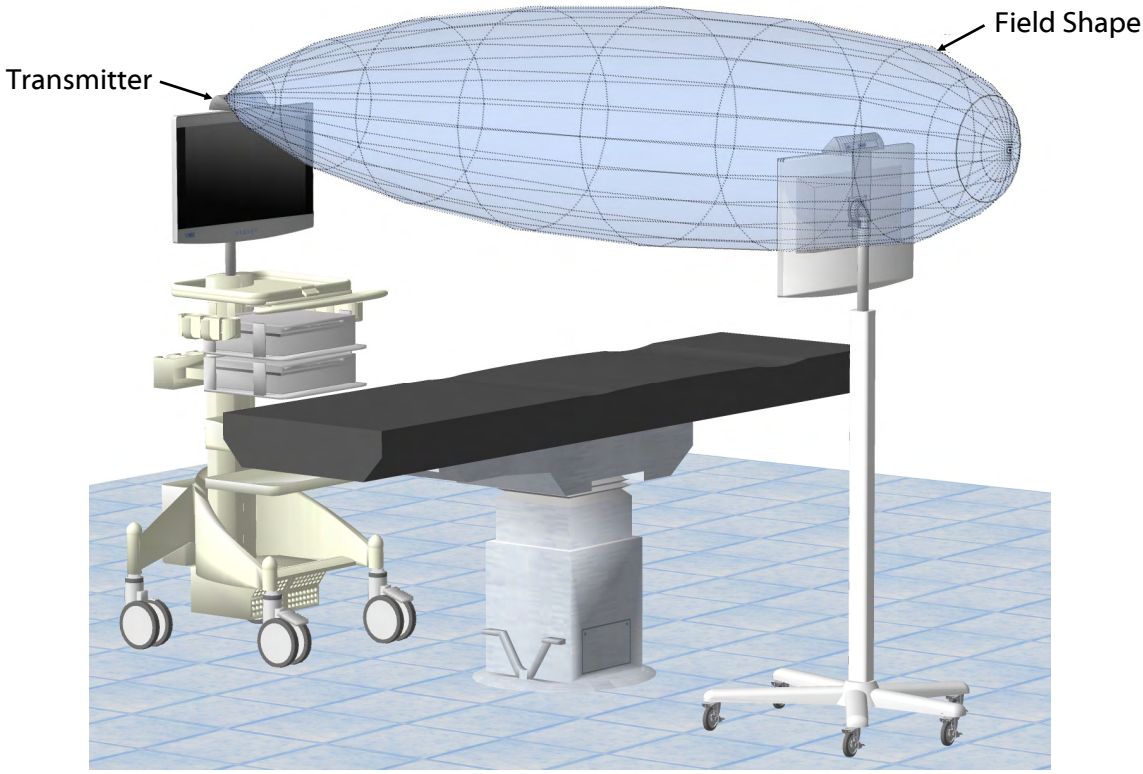
Vertical alignment should be within ±10° of vertical.

Horizontal Alignment:

Horizontal alignment should be within ±10° of horizontal.

Positioning and Orientation is continued on the following page



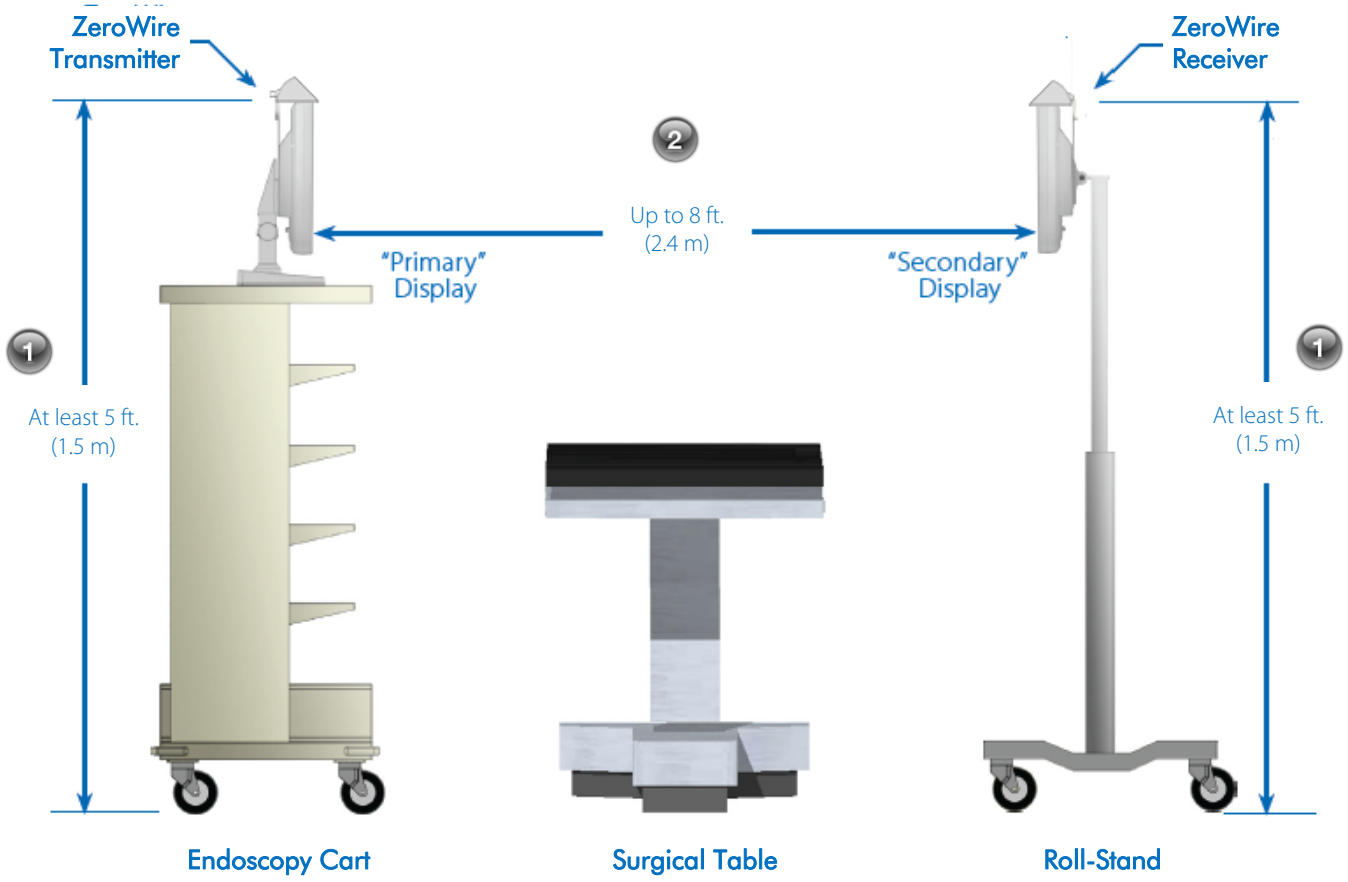


Positioning and Orientation (continued)

1 **Elevation:**
The Transmitter and Receiver should be positioned at least 5 feet (1.5 m) above the floor, be at the same height, and, preferably, with the Transmitter and Receiver front edges parallel and facing each other.

Separation:

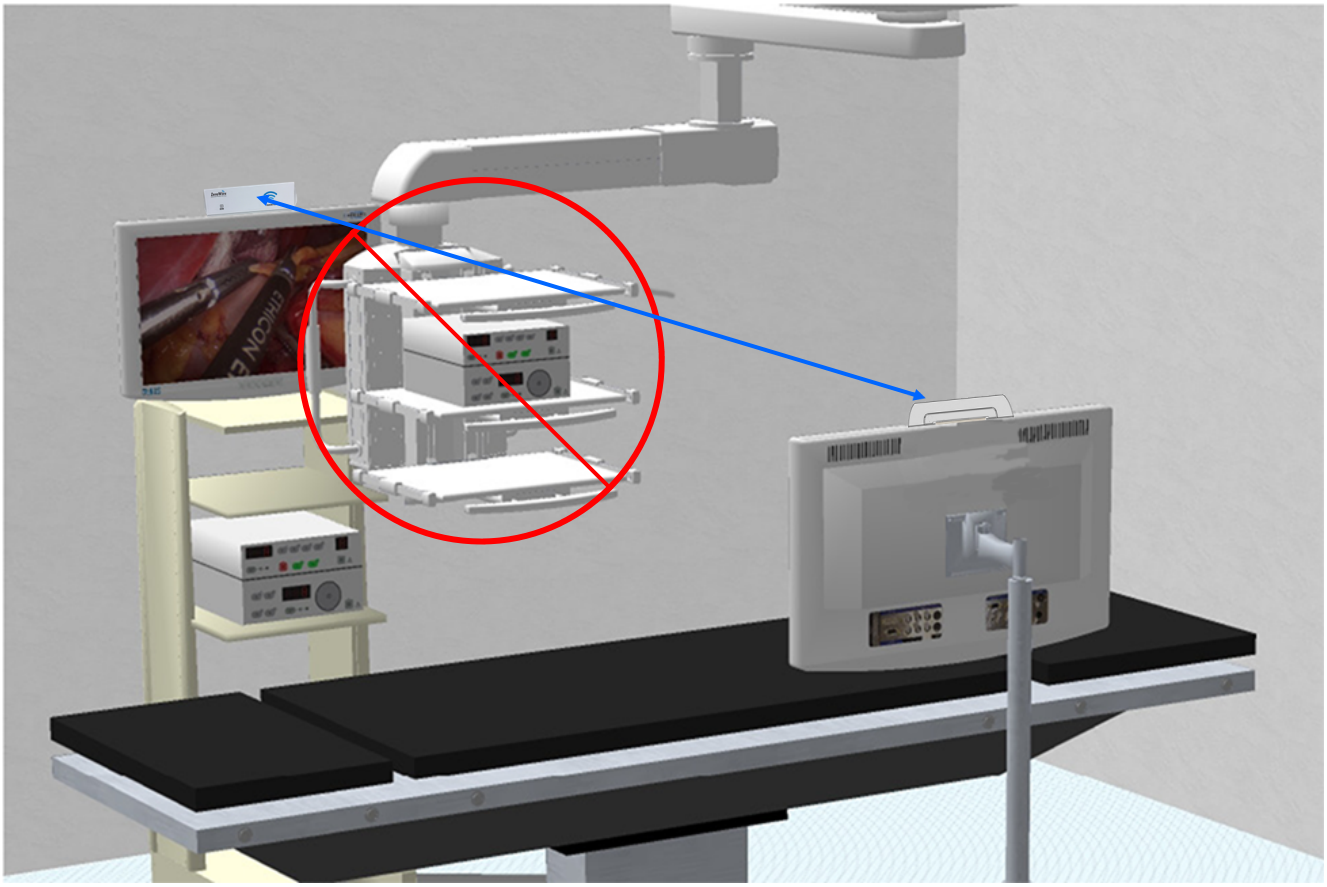
2 ZeroWire G2 operates correctly with a Transmitter and Receiver separation of up to 30 feet (9.1 m). However, in the case of most OR environments, best results are achieved with a Transmitter and Receiver separation distance of up to 8 feet (2.4 m).



Non Line of Sight Operation

The ZeroWire G2 System can maintain a wireless link with partial obstructions. However, best performance is realized with a clear line-of-sight between units. In an OR environment, the ceiling mounted boom system and its spring arm junctions, along with surgical light heads, are large metal structures that can potentially block the wireless signals if they obstruct the line-of-sight between the Transmitter and Receiver (see illustration below). Preferably, surgical lights should be positioned out of the way or raised above the line-of-sight. If an object must obstruct the line-of-sight, the best option is to position it half way between the Transmitter and the Receiver.

OR rooms whose walls and/or ceiling are constructed with metal sheets may reduce ZeroWire G2 performance. This condition possibly can be mitigated by moving the Transmitter and Receiver closer to each other, setting their line-of-sight to 0 degrees (see page 10), and ensuring that there are no obstructions between the Transmitter and the Receiver.



Avoiding Co-Channel Interference

If the ZeroWire G2 deployment is a typical one-system per room, there are essentially no restrictions. The transmitter's Channel Selection feature picks the channel that is least susceptible to interference from the two available channels based on the result of its scan at power on.

Some of the factors affecting isolation of the ZeroWire G2 channels are listed below.

1. The thickness and material of the room walls.
2. The opening and closing of room doors.
3. The room's ceiling structure and the materials used in its construction.

⚠ ZeroWire G2 Transmitter/Receiver pairs must be installed in the same room. Cross room operation is not supported. When two Transmitter/Receiver pairs are installed in a given room, each pair must be linked separately, one pair at a time, linking the second pair after successfully linking the first. There is no need to turn off the first linked pair before powering or linking the second pair.

Channel Usage

The recommendations listed below should be used to determine the appropriate setting.

1. ZeroWire G2 Transmitter and/or Receiver units cannot be used with earlier ZeroWire Transmitter and/or Receiver units.
2. A maximum of two ZeroWire G2 systems may be operated in the same room. The transmitters and receivers should be separated by at least 3 feet (1 m) within the room.
3. Groups of two ZeroWire G2 systems may be set in multiple rooms, providing the rooms are spaced at least 25 feet (7.6 m) apart.
4. ZeroWire G2 Transmitter and/or Receiver should not be installed in metal cabinets or surrounded by metallic objects, as this will prevent the Transmitter from communicating with the Receiver.

Multi System Installation

Multiple Systems:

When two systems are to be installed in a given OR use the following procedure:

1. If the Transmitter and Receiver units have not been linked apply power to one Transmitter and one Receiver then follow the Linking Procedure described on page 8.
2. Turn second Transmitter and Receiver pair on and repeat the Linking Procedure. Transmitter and Receiver pairs must be linked one pair at a time. We recommend that linked pairs be labeled to facilitate installation and troubleshooting.

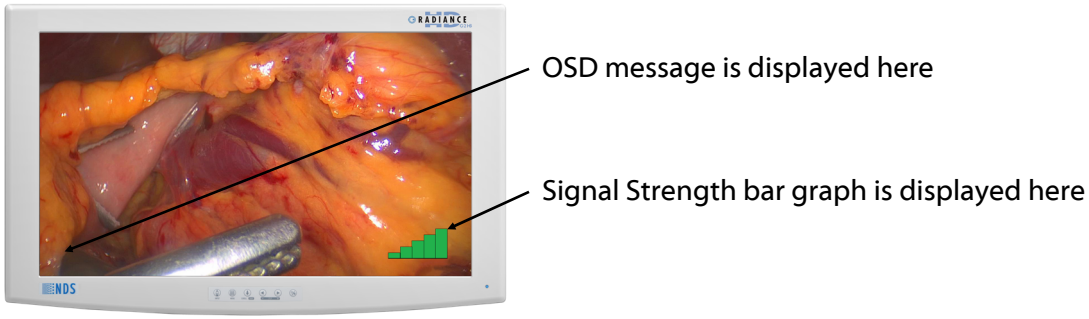
Signal Strength and On Screen Diagnostic (OSD) Messages

When a receiver is connected to a monitor, self-explanatory diagnostic messages are displayed in the lower left corner of the screen to inform the user of the receiver's current status. The messages will be displayed for 15 seconds, with the exception of "No transmitter found" and "SIGNAL LOST."

"No transmitter found" and "SIGNAL LOST" will be displayed until remedial action is taken. When the "SIGNAL LOST" message and/or the RED 1-bar graph are displayed on the screen, the wireless link is unreliable and requires immediate remedial action.

The Signal Strength bar graph is displayed in the lower right corner of the receiver's monitor for 60 seconds at power up. It is also displayed when the link is established following a link disconnect. When the link quality is poor or bad the bar graph is automatically displayed to alert the user that remedial action is required.

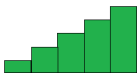
The bar graph may be activated manually by a single touch of the receiver's LINK button.

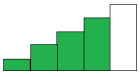


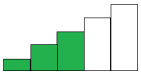
OSD Messages

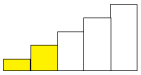
Linking	**Searching for transmitter**
Establishing Link	**SIGNAL LOST**
No transmitter found	**Wireless Linked**

Signal Strength Bar Graphs

 Excellent link quality.

 Good link quality.

 Acceptable link quality.

 Poor link quality, some pixilation may occur.

Bad link quality or link down, frequent pixilation and/or screen "freeze."

4 Troubleshooting

Problem	Possible Causes
Indicator LED is not on.	Loose Power Connector: Verify that the power source connector is fully inserted into the unit's power connector. 'Y' Cable: If you are using the 'Y' cable to supply power to the unit, confirm that it is connected to an NDS 24VDC power supply and that the power supply is energized. Stand Alone Power Supply: If the stand alone power supply is being used confirm that it is fully inserted into the wall socket. Wall Socket: Some wall sockets have on / off switches built in. If the socket you are using has a built in switch, check that it is in the on position. Additional Information: See Power Options on page 6.
No transmitter found	Verify the Transmitter unit is ON or Source signal is connected.
No image on display after changing input resolution	Cycle the ZeroWire Transmitter's and Receiver's power, not the display.
Fails to establish Link after attempting to pair	Cycle both ZeroWire Transmitter's and Receiver's power.

Poor or Intermittent Video	
Possible Causes	**Remedial Action**
Transmitter and Receiver are spaced more than 30 feet (9.1 m) apart.	Reduce the spacing between the Transmitter and Receiver to 30 feet (9.1 m) or less. See Maximum Range specification on page 16.
Transmitter and Receiver are not aligned properly	See Transmitter / Receiver alignment recommendations on page 11.
DVI or SDI (Transmitter only) connections	Confirm that the cables are properly connected.
Unsupported video mode	Verify that the applied video mode is supported. See the Supported Video Modes table on page 17.
DVI or SDI (Transmitter only) cables	Replace the cables one at a time and check the video display. If the video signal displays properly after a cable is replaced, discard the cable you just replaced.
Crosstalk	See Avoiding Co-Channel Interference on page 13
Low signal strength	See Signal Strength on page 14.
The Transmitter and Receiver are switched	Verify that the video source is connected to the Transmitter, not the Receiver.

Status LED Indicators	
LED State	**Description**
Blue and blinking slowly	The unit is scanning for a channel.
Blue and flashing rapidly	Unit is attempting to link.
Blue and steady	The unit is sending (Transmitter) or receiving (Receiver) video data.
Blue alternating ON/OFF for 3 seconds	No Linking Information stored

Specifications

Wireless Signal Type	60 Ghz Wireless HD band (WiHD)
Frequency Band	57 - 64 GHz
Video Inputs (Tx)	DVI-D, 3G-SDI
Video Outputs (Rx)	DVI-D
Video Compression	None
3D Video Support	DVI-D Interleaved (Line-by-Line)
HIPAA Support	256 bit AES Encryption
System Latency	< 1 Frame
Maximum Pairs per OR	2 Pairs
RF Power Out	< 28 dBm/MHz EIRP
Maximum Range	< 30 ft (9.14m)*
Data Rate	950 Mbps - 3.8 Gb/s
Power Consumption	< 8 Watts

Physical Dimensions	9.5” x 3.5” x 2.0” (238mm x 88mm x 50mm)
Unit Weight	1.0 lbs (0.45 Kg)
Mounting Base Weight	0.8 lbs (0.36 Kg)
Operating Temperature	32° to 104° F (0° to 40° C)
Operating Humidity	20% to 90% RH, non-condensing
Operating Altitude	6,600 ft (2,000 m)
Storage Temperature	-4° to 140° F (-20° to 60° C)
Storage Humidity	< 70% RH (non-condensing)
Transport Humidity	< 70% RH (non-condensing)
Storage Altitude	33,000 ft (10,000 m)

*The effective range may vary depending upon the environment in which the product is operating. Follow the product’s Setup section to achieve optimum performance and range.

Maximum EIPR Output Power of Test Frequency

Channels	Maximum EIPR Output Power of Test Frequency	Average EIRP Output Power
LRP Low Channel	60.32 GHz	11.7 dBm
LRP High Channel	62.79 GHz	12.1 dBm
HRP Low Channel	60.48 GHz	29.3 dBm
HRP High Channel	62.64 GHz	29.6 dBm

Supported Video Modes

Format	Frame Rate (Hz)	Horizontal Active Pixels	Vertical Active Pixels	Horizontal Total Pixels	Vertical Total Pixels
1080p	60	1920	1080	2200	1125
1080p	50	1920	1080	2640	1125
1080i	30	1920	1080	2200	562
1080i	25	1920	1080	2640	562
720p	60	1280	720	1650	750
720p	50	1280	720	1980	750
480p	60	720	480	870	525
576p	50	720	576	864	625
VGA	60	640	480	800	525
SVGA	60	800	600	1056	628
XGA	60	1024	768	1344	806
SXGA	60	1280	1024	1688	1066
UXGA	60	1600	1200	2160	1250
Custom Mode	60	1280	1024	1688	1066
Custom Mode	60	1292	960	1576	1000
Custom Mode	60	1023	768	1396	806
Custom Mode	60	1248	1024	1688	1066
Custom Mode	60	1280	1024	1716	1108
Custom Mode	60	1440	900	1904	932
Custom Mode	60	1024	1024	1686	1068
Custom Mode	60	1024	1024	1124	1068
Custom Mode	50	1024	1024	1280	1125
Custom Mode	60	1280	1024	1688	1066
Custom Mode	60	1920	1080	2200	1125
Custom Mode	60	1920	1080	2184	1125
Custom Mode	50	1920	1080	2270	1125

ZeroWire G2 Accessory Kits by Display

Display	NDS Part #	ZeroWire G2 Accessory Kit	
		Pair: (Transmitter and Receiver)	Single: (Transmitter or Receiver)
EndoVue 24" (Standard)	90K0010	90Z0152	90Z0153
China Model	90K0011		
Discontinued Model	90K0004		
Radiance Full MMI 24" (Standard)	90R0019	90Z0152	90Z0153
with Fiber	90R0022		
with Touch	90R0037		
with Fiber & Touch	90R0038		
China model	90R0058		
Radiance G2 24" (Standard)	90R0063	90Z0152	90Z0153
with Fiber	90R0064		
with Touch	90R0065		
with Fiber & Touch	90R0066		
China model	90R0067		
Radiance Full MMI 26" (Standard)	90R0029	90Z0152	90Z0153
with Fiber	90R0030		
Radiance G2 26" (Standard)	90R0050	90Z0152	90Z0153
with Fiber	90R0051		
China model	90R0061		
Radiance G2 HB 26" (Standard)	90R0052	90Z0154	90Z0155
with Fiber	90R0053		
China model	90R0062		
Radiance Ultra 27" (Standard)	90R0104	90Z0156	90Z0157
with Analog Board	90R0102		
with Digital Board	90R0100		
Radiance G2 42" (Standard)	90R0070	90Z0158	90Z0159
Radiance G2 55" (Standard)	90R0069	90Z0158	90Z0159
with Touch	90R0068		

Cleaning Instructions

⚠ Prior to cleaning, the unit should be turned **OFF** and disconnected from its power source.

Cleaning:
Thoroughly wipe all exterior surfaces with a lint-free cloth that has been dampened with an acceptable cleaning agent. Acceptable cleaning materials are listed below. Remove residual detergent by wiping all exterior surfaces with a lint-free cloth dampened with distilled water.

Disinfecting:
Disinfect the unit by wiping all exterior surfaces with a lint-free cloth dampened with 80% Ethyl Alcohol. Allow the unit to air dry.

Cautions:

⚠ Do not allow liquids to enter the interior of the unit.

Acceptable Cleaning Materials:
Vinegar (distilled white vinegar, 5% acidity)
Ammonia-based glass cleaner

Acceptable Disinfecting Material:
Ethanol 80 % by volume

***Note:**
The acceptable cleaning and disinfecting materials listed above have been tested on NDS products and, when used as directed, do not harm the product's finish and or its plastic components.

6 Electromagnetic Compatibility (EMC) Tables

ZeroWire G2 has been tested in an OR environment and did not interfere with electrosurgical, ultrasound, X-Ray, medical displays and life monitoring equipment. Neither did the aforementioned equipment interfere with ZeroWire G2. Additionally, since ZeroWire G2 operates in 57 – 64 GHz, typically wireless LAN and mobile phones will not cause interference as they operate outside the ZeroWire G2 frequency range. However, the presence of a source of interference within ZeroWire G2 frequency range may result in intermittent operation and reduced image quality or the link could go down while the interference exists. Prior to any procedure in the OR, it is required that any such equipment be turned off and verify that the system operates as expected. If any anomalous behavior is observed, it must be corrected prior to using the system in any surgical procedures.

ZeroWire G2 transmitters should be separated by at least 20 inches (0.5 m). ZeroWire G2 transmitters (Transmitter) or receivers (Receiver) should not be installed in metal cabinets or surrounded by metallic objects, as this will prevent the Transmitter from communicating with the Receiver.

During installation the ZeroWire G2 link video quality should be tested with the Transmitter and Receiver at different orientation angles, acceptable orientation angles are shown on page 10. Non Line of Sight Operation is discussed on page 12. We recommend that the system be thoroughly tested prior to using it in any surgical procedures.

Do not use power supplies or cable accessories with the ZeroWire G2 other than those specified in this manual. Excessive leakage currents, elevated electromagnetic emissions, or insufficient interference immunity may occur.

All medical electronic devices, including ZeroWire G2, must conform to the requirements of IEC 60601-1-2. Precautions, adherences to the EMC guideline information provided in this manual and verification of all medical devices in simultaneous operation are required to ensure the electromagnetic compatibility and co-existence of all other medical devices prior to a surgical procedure.

The EMC tables on the following four pages are provided for your reference.

EMC Tables

Guidance and manufacturer's declaration – electromagnetic emissions		
The product is intended for use in the electromagnetic environment specified below. The customer or the user of the product should assure that it is used in such an environment.		
Emissions	Compliance	Electromagnetic environment-- guidance
RF emissions CISPR 11	Group 1	The product uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The product is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Not Applicable	
Voltage fluctuations/ flicker emissions IEC 61000 -3-3	Not Applicable	

Guidance and manufacturer's declaration 211; electromagnetic immunity			
The product is intended for use in the electromagnetic environment specified below. The customer or the user of the product should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines	±2 kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV line(s) and neutral	±1 kV line(s) and neutral	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for 0,5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5s	<5 % U_T (>95 % dip in U_T) for 0,5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles) <5 % U_T (>95 % dip in U_T) for 5s	Mains power quality should be that of a typical commercial or hospital environment. If a dips or an interruption of mains power occurs, the current of the product may be dropped off from normal level, it may be necessary to use uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	Not applicable	Not applicable
NOTE U_T is the a.c. mains voltage prior to application of the test level			

EMC Tables

Guidance and manufacturer's declaration – electromagnetic immunity			
The product is intended for use in the electromagnetic environment specified below. The customer or the user of the product should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
Conducted RF IEC 61000-4-6	3 Vims 150 kHz to 80 MHz	3 Vims	Portable and mobile RF communications equipment should be used no closer to any part of the product, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1{,}2\sqrt{P}$ $d = 1{,}2\sqrt{P}$ 80 MHz to 800 MHz $d = 2{,}3\sqrt{P}$ 800 MHz to 2,5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation Distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, a should be less than the compliance level in each frequency range.b Interference may occur in the vicinity of equipment marked with the following symbol:
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
a. Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the product is used exceeds the applicable RF compliance level above, the product should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the product. b. Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.			

Recommended separation distances between portable and mobile RF communications equipment and the product

The product is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the product can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the product as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power (W) of transmitter	Separation distance, in meters according to frequency of transmitter		
	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2.5 GHz
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

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